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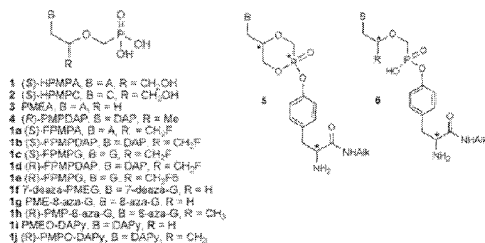
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[Continued on next page]

(54) Title: METHOD TO IMPROVE ANTIVIRAL ACTIVITY OF NUCLEOTIDE ANALOGUE DRUGS



(57) Abstract: A method of modifying a nucleotide or a nucleotide analogue to increase its overall effectiveness in treating an antiviral disease is provided. In some cases, a compound comprising a base, sugar, phosphonate moiety, and amino acid residue is provided, where the base-sugar may be a nucleoside, and the amino acid residue may be a tyrosine residue. In certain cases, the tyrosine residue contains a long chain alkyl group on the carboxamide group of the residue. Methods of inhibiting viral replication and methods of treating a viral infection are also provided.

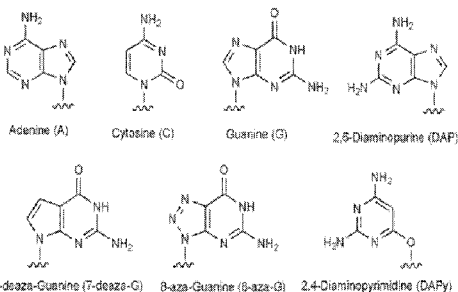


FIG. 1



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
31 January 2013

A. CLASSIFICATION OF SUBJECT MATTER*A61K 31/66(2006.01)i, A61K 48/00(2006.01)i, A61P 31/12(2006.01)i, A61P 31/00(2006.01)i*

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61K 31/66; A61P 31/12; A61K 9/20; A61K 31/675; A61K 9/127; C07F 9/09

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal), PubMed, google, googel scholar

& Keywords: nucleoside, phosphonate, lipophilic alkyl, antiviral

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PETERSON, L. et al., `Serine side chain-linked peptidomimetic conjugates of cyclic HPMPc and HPMPA:synthesis and interaction with hPEPT1` Mol Pharm, epub 07 October 2010, Vol. 7, No. 6, pages 2349-2361. See abstract, Fig 1, Scheme 1.	1-20,22-25
A	US 2008-0227754 A1 (BECKER MARK W. et al.) 18 September 2008 See abstract, claims 34,35.	1-20,22-25
A	US 2006-0246130 A1 (TERRENCE DAHL et al.) 02 November 2006 See abstract, claim 1, paragraph 42.	1-20,22-25
A	US 2009-0270618 A1 (HILFINGER JOHN et al.) 29 October 2009 See abstract, claim 1, paragraph 52.	1-20,22-25
A	US 2007-0003608 A1 (MERRICK ALMOND et al.) 04 January 2007 See abstract and claims.	1-20,22-25

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: 21
because they relate to subject matter not required to be searched by this Authority, namely:
Claim 21 pertains to methods for treatment of the human body by therapy, and thus relate to a subject matter which this International Searching Authority is not required, under Article 17(2)(a)(i) of the PCT and Rule 39.1(iv) of the Regulations under the PCT, to search.
2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/036846

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